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ABSTRACT

A study was conducted to determine the effects of three university supervisory approaches on the development of classroom techniques common to a specific teaching strategy. The 20 subjects, student teachers who had been introduced in a methods course to the inductive indirect teaching strategy desirable for science teachers, underwent three different supervisory treatments. Group 1 received traditional supervision: classroom visits from the university supervisor, each followed by a conference to reexamine the student teacher's behavior. Group 2 received traditional supervision supplemented by viewings and discussion of selected films and video tape recordings of experienced teachers using the teaching strategy. Group 3 received traditional supervision supplemented by viewings of video tape recordings of their own teaching behavior. A rating of each subject's teaching performance was obtained from a 20-minute video taped post-lab discussion session. The degree of inductive indirect strategy exhibited was measured with the Teaching Strategies Observation Differential (TSOD) (SE008 655) by four trained raters, two randomly assigned to view each tape. Overall results of the study were not statistically compelling although group norms on the criterion measure follow the hypothesized trend. It was inferred that the Group 3 treatment was more successful than that of Group 1. Results did not clearly define the effects of the Group 2 treatment. (JS)

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DIFFERENTIAL EFFICACY OF THREE SUPERVISORY METHODS FOR DEVELOPMENT OF A TEACHING STRATEGY

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> Some of the improvements we seek in education can be brought about by spending more money, building better schools, introducing new courses, etc., but the really important changes will come about only as teachers change. (Combs, 1965, p. v)

The teacher is a powerful filtering agent and largely determines the value of instructional materials.

Gallagher (1967) asserted that teachers have different approaches to instructional strategy which result in different ideas and concepts being presented to students. If this is true, the classroom teacher determines the final definition of curriculum for the school and must be an important focal point in any attempt to implement curricular changes designed to achieve current and future instructional goals.

After a decade of intensified interest in in-service training for teachers across the nation, many school systems have found that their veteran teachers were substantially "retrained," but their new teachers were in need of the same retraining. Pre-service teaching programs obviously need review.

A logical entry point for sponsoring behavioral development toward a given teaching strategy was indicated by Wiggins (1964, p. 220):

> Teacher education can be considerably worse, but it can hardly be any better than the student teaching . . . designed to give substance to theory and to translate concepts into operational competencies.

Theory presented in the "science methods" course, required of all science teacher candidates in this study, supported a teaching approach urged by most of the national science curriculum projects, i.e., guided inquiry. This teaching approach is variously defined in the literature but is essentially equivalent to inductive-indirect teaching strategy, the development of which was encouraged for subjects in this study.

Reed (1964) reminds us that the job of the supervisor is to help the student teacher do better what he sees as his job and to better see what his job is. It would appear that carefully planned

supervision throughout this period could effect or mediate desired outcomes. The probability of effecting behavioral change at this time is enhanced by the facts that the act of teaching is finally practiced in vivo and that the art of teaching is in an embryonic state of development where rapid changes can be made in technique.

How can this supervisory emphasis best be implemented during the relatively short final period during which the college or university is responsible for the guidance of our nation's teachers? This question is the raison d'etre of the study here reported.

Purpose

The major purpose of this study was to delimit one teaching strategy deemed worthy of development by science teachers and to apply various university supervisory approaches to ascertain their effects upon student-teachers' development of classroom techniques common to that strategy.

Subjects

All subjects were enrolled in student-teaching at the University of Colorado during the spring semester, 1969. Each student had previously taken or was concurrently enrolled in "Methods in Teaching Science" in secondary school. These students were assigned in an essentially random fashion to cooperating teachers who taught in the content area of their preparation, in public schools within a fifty-mile radius of Boulder, Colorado. Actual time and responsibility for teaching varied among students, but each had at least ten weeks during which he or she was responsible for one or more classes.

Tables 1 and 2 further describe subjects and their student-teaching assignments.

Strategies

Expository-direct teaching: Figure 1 symbolizes expository-direct teaching strategy (E-D). Possible interactions are represented between the learner, the teacher, and phenomenal reality (represented by arrows and the symbols L, T, and R respectively). The teacher using techniques which fit this model serves as interpreter, explaining reality to the learner. The teacher tells and directs the

solution to problems; he gives directly the information needed to solve them. Expository-direct teaching may be described briefly as dispensed knowledge for direct application without the necessity of inference or further organization by the learner.

Table 1

Characteristics of the Twenty Student-Teachers

Sex	Age	Grade Point Average	Semester Credits in Science
Male---- 8	19-21--- 7	2.00-2.50-- 4*	40-50----6
Female--12	22-24---10	2.51-2.99--10**	51-60----6
	25-27--- 0	3.00-3.50-- 6	61-70----6
	28-30--- 1	3.51-4.00-- 0	over 70--2
	over 30- 2		

*2.25 is the minimum acceptable grade point average for the teacher education program.

**Only undergraduate grades were considered for the one graduate student; that average falls within this range.

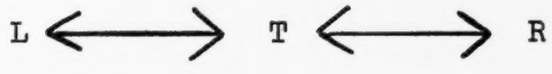

Figure 1

Expository-direct Teaching Model Showing Possible Interactions Among Learner, Teacher, and Reality

Table 2

Assignment Characteristics*

Type of School	Cooperating Teachers
Suburban	General Teaching Style
Lower Middle to Upper Middle Class--6	1 Expository-direct---3 (1.0-1.9)
Upper Lower to Lower Middle Class---5	2 ---6 (2.0-2.9)
	3 ---9 (3.0-3.9)
Inner City	4 ---2 (4.0-4.9)
Upper Lower to Lower Middle---------2	5 Inductive-Indirect--0 (5.0----)
Lower Lower to Upper Lower----------3	
Small Town	
Lower Middle to Upper Middle Class--1	
Middle Lower to Lower Middle Class--3	Freedom Allowed Student-Teacher
	1 Completely directive---2 (1.0-1.9)
	2 ---3 (2.0-2.9)
	3 ---6 (3.0-3.9)
	4 ---8 (4.0-4.9)
	5 Allowed total independence within regulations of the school ---1 (5.0----)

*These ratings are averages of subjective ratings submitted by the three university supervisors for the twenty student-teachers.

Inductive-indirect teaching: Figure 2 represents inductive-indirect strategy (I-I); symbols may be interpreted as in Figure 1. The teacher, in this model, endeavors to place the learner in direct contact with phenomenal reality. Teacher responses to questions encourage the learner to search for his own answers, through either experimentation, observation, or the use of his own thought processes. For the pupil, the essential ingredient is feedback from reality without the teacher's interpretation to him of what is true. This strategy is one of guiding students in coping with problems which they identify.

In the inductive-indirect classroom, learners apply both inductive and deductive thought processes, but the teacher uses inductive-indirect techniques. He allows open-ended contact with reality in the approach to a problem. He encourages inferences drawn by the learner rather than providing conclusions through exposition or accepting only the "expected" conclusion.

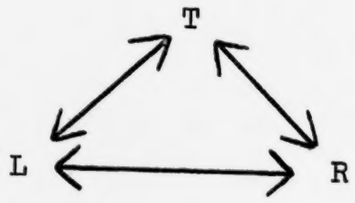

Figure 2

Inductive-indirect Teaching Model Showing Possible Interactions Among Learner, Teacher, and Reality

The pupil's role in these two models, varies from possible passivity in E-D situations to necessary activity and responsibility for his own learning in the I-I model.

Treatments

Gallagher (1967) expected that a re-examination, through analysis of one's own performance, provides a medium through which a teacher's instructional techniques can be effectively modified. Merrill wrote about supervision of the student-teacher emphasizing the need to encourage self-criticism; ". . . If he [the student-teacher]

can do this, he will generate within himself the ability for continuous improvement." (Merrill, 1967, p. 87)

How the university supervisor interprets and implements such re-examination by the student-teacher might be broadly categorized as symbolic, vicarious, and participant. Experimental treatments employed in this study fall under those general rubrics as follows:

I. The "Traditional" group whose members received designated classroom visits from the university supervisor. Each of these observations was followed by a conference between the supervisor and the student-teacher, during which the student's teaching behavior was re-examined. Imperfect recall and supervisor's notes serve as symbols for examination.

II. The "Modeling the Master" group whose members received supervisory visits as above, supplemented by selected films and video tape recordings of experienced teachers using the teaching strategy under development. The group and the experimenter discussed the teaching behavior after each session. Vicarious examination of one's own teaching behaviors through comparison with those viewed under similar conditions was thus possible. If students could identify with the master-teacher viewed and model his techniques, it should be possible to shorten the time necessary to develop those techniques by individual trial and error alone.

III. The "Mastering the Model" group whose members also received traditional supervision which was supplemented by the viewing of video-tape-recordings (VTR) of themselves teaching in their assigned classrooms. The experimenter provided reinforcement and discrimination training during these playback sessions. These participants in their self-evaluation were assumed to be in a role akin to that described in inductive-indirect teaching strategy itself, because they were taken from the more passive role of being observed to one of more active participation in coping with their own real problems.

Many research reports were considered in delimiting the treatments to be employed. Several of the more helpful ones not otherwise cited are listed in the reference section and marked with an asterisk.

See James (1970) for a detailed discussion of these studies and of the rationale for the teaching strategy employed herein.

Hypotheses

The basic variable manipulated was feedback. It was varied through the medium by which it reaches the student, as well as the degree of participation and identity with which the student meets the opportunity for perception of feedback, i.e., the probability of a one-to-one correspondence to facilitate meaning.

Hypotheses generated from the basic purpose of the study were tested as follows:

$$H_1: \mu_{III} - \mu_I > 0,$$

$$H_2: \mu_{III} - \mu_{II} > 0, \text{ and}$$

$$H_3: \mu_{II} - \mu_I > 0.$$

Design

The basic design employed is shown in Figure 3. Notation is according to Campbell and Stanley (1963)

	Experimental Treatment		Criterion Measure
R (assignment)	Group I	X_1	O_1
	Group II	X_2	O_1
	Group III	X_3	O_1

Figure 3

Basic Quasi-Experimental Design for Testing Effectiveness of Supervisory Treatments

Procedure

Supervisory method (independent variable): The treatment groups and the supervisory method used with each were discussed in a previous section, therefore only the schedule of that treatment will be described in this section.

All student-teachers were visited on five or more occasions; each of these visits was followed by a conference with the supervisor. Group II viewed a total of six films at three monthly sessions. Group III participants were video taped on a monthly schedule, and each tape was viewed within six hours of its recording. It was first viewed by the student alone and then by the student and the experimenter.

All students had been introduced to the teaching strategy models and their implications during "methods" class sessions. All students had been previously filmed or taped in their classroom or in a similar situation before the final evaluation tape was made at the end of the student-teaching semester. These precautions were necessary to eliminate bias due to lack of exposure to the method of collecting data for the criterion measure.

Teaching performance (dependent variable): The criterion measure was a rating of each student's teaching performance from a twenty minute video-taped post-lab discussion session. This session had been arranged by mutual agreement among the student, his cooperating teacher, and his university supervisor several weeks in advance of the taping during the final week of the student-teaching assignment.

The degree of I-I teaching strategy exhibited was measured by the criterion instrument, the Teaching Strategies Observation Differential (TSOD). Numerical codes from 1 to 9 indicative of teaching techniques ranging from extreme E-D behaviors to extreme I-I ones were encoded onto the TSOD rating sheet at one minute intervals. An average was then computed which represents the overall activity during the observed session. Specific guidelines for categorizing observed behaviors were provided with the TSOD rating sheet. Four trained raters were randomly assigned to view tapes from each treatment group, so that all tapes were rated by two raters. The treatment group to which any student-teacher was assigned was not known to any rater. For details of the TSOD instrument, its development, reliability, and training of raters, see Anderson, James and Struthers (1970).

Composite reliability of the two ratings of all teachers on the TSOD was .94[1], while the reliability of a single rating was .89[2].

Results

Ratings of teaching performance were submitted to analysis of variance through BMD computer program 01V (Dixon, 1968). Results of that analysis are shown in Table 3.

Table 3

Differences Among Treatment Groups on the Teaching Strategies Observation Differential

ANOVA Table			
Source of Variation	df	MS	F*
Treatments	2	1.7224	1.5191
Error	15	1.1338	

* $_{.90}F_{2,\ 15} = 2.70$ -- only 18 scores were used to attain = n's

The small sample size and general heterogeneity within groups, because of the variety of classes taught and other influencing variables of the seven school districts to which they were assigned, attenuated the power to test the hypotheses. This handicap was realized during the design stage and plans were made to use orthogonal contrasts eliminating the necessity of the omnibus F test. The restrictions of orthogonality, however, eliminate tests of primary interest in this study. Winer (1962, p. 208) suggested:

> The specific comparisons which are built into the design or suggested by the theoretical basis for the experiment can and should be made individually regardless of the corresponding overall F test.

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[1] r of k ratings $= 1 - \frac{\text{MS error}}{\text{MS between people}}$ (Winer, 1962, p. 128).

[2] r of single rating $= \frac{\text{MS bet. people} - \text{MS w. people}}{\text{MS bet. people} + (k-1)\ \text{MS w. people}}$ (Winer, 1962, p. 126).

When only three means are involved, multiple t tests are often employed. These are equivalent to orthogonal contrasts when only two means are involved, but significance levels of the students' t distribution become increasingly spurious as k (the number of means involved) increases. The results of these comparisons appear in Table 4.

Table 4

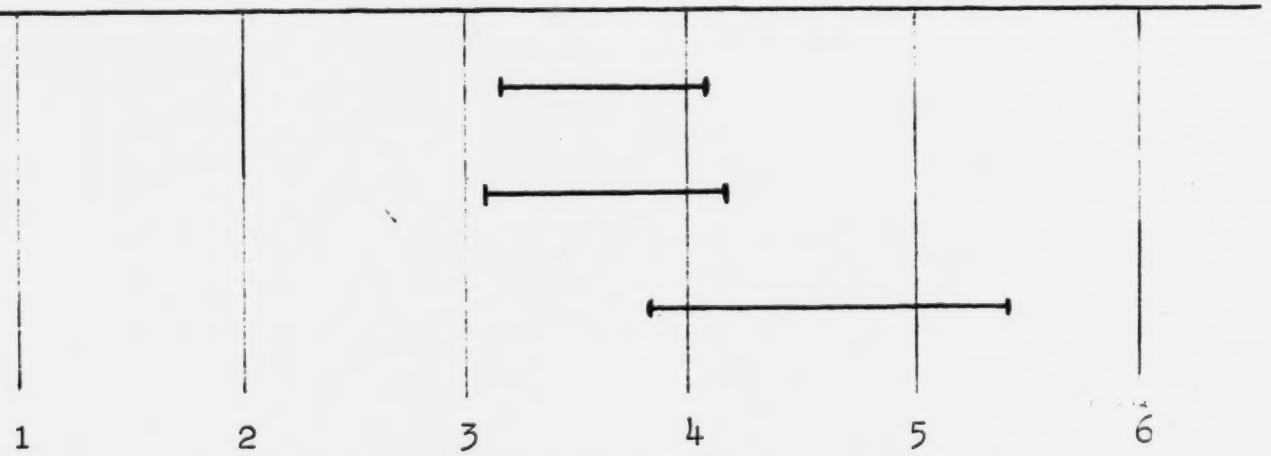
Planned Comparisons of Treatment Group Means on the TSOD*

Means: $\bar{X}_I = 3.643$	$\bar{X}_{II} = 3.678$	$\bar{X}_{III} = 4.588$
H_1: $\mu_{III} = \mu_I$;	t = 1.537	(p. < .10)
H_2: $\mu_{III} = \mu_{II}$;	t = 1.480	(p. < .10)
H_3: $\mu_{II} = \mu_I$;	t = .056	(p. > .30)

* $S_{\bar{X}_i - \bar{X}_j} = \frac{\sqrt{2\ MSe}}{n}$

To provide a clear interpretation of the difference between the groups on the teaching performance measure, a graphic representation of the confidence interval for μ was calculated for each sample mean. These are presented in Figure 4. It is apparent that the confidence intervals computed from μ_I and μ_{III} are only slightly overlapping and thus probably do delimit means from different populations. The confidence limits of μ_{II}, however, overlap both those of μ_I and μ_{III}: Thus $\bar{X}_{II}$ may not be interpreted as estimating μ of a population different from either of the other two, but might be a sample mean from either of them.

Treatment Group	s	$\bar{X}$	.90 Confidence Interval
I	.7886	3.6433	
II	.9814	3.6783	
III	1.3477	4.5883	



* .90 C.I. for $\mu = (\bar{X} \pm t_{.10}\, s_{\bar{X}})$ (Ferguson, 1959, p. 23)

Figure 4

Confidence Intervals for μ^* for Treatment Means
on the Teaching Strategies Observation Differential

Conclusion

Overall results of the study were not statistically compelling although group means on the criterion measure follow the hypothesized trend.

Of the three hypotheses generated by the general rationale of the study and by the design with which it was carried out, only H_1 was adequately supported by the data. The basic inference drawn from results of testing these hypotheses is that traditional supervision supplemented by opportunities for self-confrontation and self-evaluation via video-taped feedback of a student-teacher's own classroom teaching behavior facilitated the development of the desired inductive-indirect teaching strategy to a higher degree than did traditional supervision alone. Effects of traditional supervision supplemented by viewing films of experienced teachers using the desired strategy were not clearly defined by the results of this study.

Obtaining these results is encouraging since the sample was extremely small and experimental conditions allowed a great deal of heterogeneity within each group. Further refinement of the TSOD has increased its sensitivity, and replication of this study should provide more definitive results.

SELECTED REFERENCES

*Acheson, Keith A. "The Effects of Feedback from Television Recordings and Three Types of Supervisory Treatments on Selected Teacher Behaviors." University Microfilms, Ann Arbor, Michigan, 1964.

*Allen, Dwight, et al. "Effects of Feedback and Practice Conditions on the Acquisition of a Teaching Strategy." ERIC Research in Education (Microfiche ED013794), 1966.

Anderson, R. D., Helen H. James, and J. A. Struthers. "Development of a Verbal and Non-verbal Observation Instrument." A paper presented at AERA in Minneapolis, Minnesota, March, 1970.

Campbell, D. T., and J. C. Stanley. Experimental and Quasi-Experimental Designs for Research. Rand McNally, Chicago, 1963.

Combs, Arthur W. The Professional Education of Teachers. Allyn and Bacon, Inc., Boston, 1965.

Dixon, W. J. (ed.) BMD Biomedical Computer Programs. University of California Press, Berkeley, California, 1968.

Ferguson, George A. Statistical Analysis in Psychology and Education. McGraw-Hill, New York, 1959.

Gallagher, James. "Teacher Variation in Concept Presentation in BSCS Curriculum Program." BSCS Newsletter. Biological Sciences Curriculum Study, Boulder, Colorado, January, 1967.

*Higgins, James V. "A Comparative Study of Change in Teacher Behavior as a Function of Face-to-Face Discussion, the Administrative Bulletin, and Self-Confrontation." University Microfilms, Ann Arbor, Michigan, 1967.

*Hill, Winfred. Learning. Chandler Publishing Company, San Francisco, 1963 (Chap. 5)

James, Helen. "Effects of Three Supervisory Methods for Development of a Teaching Strategy among Science Student Teachers." Unpublished Dissertation, University of Colorado, 1970.

*MacDonald, Frederick, et al. "The Effects of Self-feedback and Reinforcement on the Acquisition of a Teaching Skill." ERIC Research in Education (Microfiche ED013 782), 1966.

*Mackey, William F. "Practice Teaching: Models and Modules." ERIC Research in Education (Microfiche ED015-698), 1967.

Merrill, Edward C., Jr. Professional Student Teaching Programs. The Interstate Printers and Publishers, Inc., Danville, Illinois, 1967.

*Olivero, James L. "Summary and Conclusions: The Use of Video-Recordings when Substituted for Live Observations in Teacher Education." (mimeo) received from Dr. Olivero, Southwestern Cooperative Education Laboratory, Albuquerque, New Mexico, received March, 1969.

Reed, Helen. "The University Supervisor in a Multi-Purpose University in a Rural Setting," in The Supervisor: Conflict and Challenge. Forty-third Yearbook, The Association for Student Teaching, Cedar Falls, Iowa, 1964.

*Reynolds, George, Jr. "The Usefulness of the Portable Video Recorder in Supervising Student Teachers of Science." University Microfilms, Ann Arbor, Michigan, 1966.

*Ringness, Thomas. "Effect of Clinical Evaluation on Supervision of Student Teachers." Interaction Newsletter, 2,#2: May, 1967.

*Scriven, Michael. "Reflections on Current Problems." Address to Social Science Consortium and Guests, University of Colorado, March 26, 1969.

*Stoller, Nathan and Gerald S. Lesser. "Use of Television for Improving Teacher Training and for Improving Measures of Student Teaching Performance." Phase I--A Comparison of Methods of Observation in Pre-service Teacher Training; Hunter College, New York (Cooperative Research Project #278, University of Colorado Library), 1963.

*Tintera, James A. "Analysis of Methods in Which Application of New Communications Media May Improve Teacher Preparation in Language, Science, and Math." ERIC--ED003527, 1963. (Also Cooperative Research Report #270, University of Colorado Library.)

Wiggins, Samuel. "Preparing Specialists in Teacher Education," in Changes in Teacher Education: an Appraisal. TEPS--18th National Conference, National Education Association, Washington, D.C., 1964.

Winer, B. J. Statistical Principles in Experimental Design. McGraw-Hill Book Company, New York, 1962.